Road Accidents in December 1964 and January 1965

(with special reference to Christmas and New Year)

SUMMARY

THE RESULTS of the Road Research Laboratory's investigation into fatal road accidents at Christmas 1963, in conjunction with other studies of the effect of alcohol on accidents and behaviour, suggested that the consumption of alcohol had been an important factor in causing these accidents. The Government therefore decided to conduct a national campaign during November and December 1964 to discourage driving after drinking alcohol. In October 1964 the Road Research Laboratory was invited to study the accidents at Christmas 1964 and to determine what effect, if any, the campaign had on the number of casualties during that period.

Much information concerning accidents at this time, including many details not normally recorded, was obtained for the investigation with the co-operation of the police, coroners and procurators fiscal.

During the six-day period December 23rd to 28th, 1964, 119 persons were killed in 110 fatal road accidents in England and Wales. Thirty-four of these fatalities occurred in the 12 hours between 3 p.m. on Christmas Eve and 3 a.m. on Christmas Day. Fog or ice or both were present in one-fifth of these fatal accidents. In addition to those killed, a further 109 were injured (59 of them seriously) in the same fatal accidents.

Alcohol is known to have been consumed shortly before these fatal accidents by 31 per cent of the riders and drivers involved in them. Although a similar percentage was found from the data for Christmas 1963, it does not follow that no change occurred in the proportion of accidents involving alcohol, because the information on this was more exhaustive in 1964 than in 1963.

Twenty-four per cent of the pedestrians killed are known to have consumed alcohol.

A survey made at two sites in the south of England showed that, between 6 p.m. and midnight on seven weekdays in December 1964 before Christmas, about one-fifth of the motorcyclists and car drivers who were stopped on the road and tested had recently consumed alcohol. The data are, however, not sufficient to provide satisfactory evidence about the effect of the campaign on the numbers of road users driving after drinking alcohol.

Arrangements were made for the blood of road users (excluding children) who died within 12 hours of being injured in a road accident during December 1964 and January 1965 to be tested for alcohol. In England and Wales, alcohol was found to be present in 38 per cent of the drivers

and motorcyclists killed and in 34 per cent of all road users killed. Of the drivers and motorcyclists killed in this group who had consumed alcohol, three out of four had alcohol levels greater than that which the drink and driving campaign warned drivers against exceeding. A high proportion of the drivers and road users killed on Christmas Eve and New Year's Eve, Christmas Day and New Year's Day had consumed alcohol. This proportion is not significantly different from that for Saturdays and Sundays combined in December and January (excluding the two weeks containing Christmas and New Year). The proportion for these two weeks combined is not significantly greater than that during the rest of the two months.

The number of casualties per mile travelled was lower during Christmas 1964 than during other recent Christmas periods. Analysis showed that, after allowing for the effects of wet weather, the day of the week on which Christmas Day fell and any tendency for the casualty rate to change systematically over a period of years, there were between 10 and 15 per cent fewer casualties than would have been expected if there had been no campaign. This reduction could, however, have occurred because of unknown factors or changes in conditions and cannot be definitely attributed to the drink and driving campaign.

An additional analysis showed that after the effect of wet weather had been taken into account there were more casualties on ordinary days of December 1964 (excluding Christmas Eve and Christmas Day) than in the corresponding hours of the two previous Decembers both during the hours with the highest proportions of accidents involving alcohol and in other hours. On the other hand, there is some evidence that on ordinary days the amount of traffic increased more in the 'drink accident' hours than at other times. If this were true for the country as a whole it would suggest that the campaign may have reduced the casualty rate during the 'drink accident' hours on ordinary days of December.

The highest injury accident rates per mile travelled at Christmas 1964 occurred on the night of December 24th–25th and were about the same as those on the preceding Saturday–Sunday night, when they were higher than on other days of the week. The rates on the night of December 31st — January 1st were higher than those at Christmas.

Of the drivers interviewed after the campaign who drink, about a quarter reported that, compared with three months ago, they were now less likely to drink a bit too much and then drive. Comparisons of replies from a representative group of drivers interviewed after the campaign with replies from another group seen before showed an increase in the proportion who were not prepared to say how much alcohol any one, other than a teetotaller, can safely take before driving and a fall in the proportion who thought some drivers were safer after a few drinks. There was also some increase in knowledge of the legal penalties for drinking and driving offences. Answers to questions about attitudes suggested that, after the campaign, drivers were a little less tolerant of drinking and driving.

Although some of the evidence is consistent with casualties being reduced as a result of the drink and driving campaign, it is not sufficient to allow a conclusion to be drawn on this point.

INTRODUCTION

At the request of the Minister of Transport, special investigations were made by the Road Research Laboratory into the circumstances of fatal accidents at Christmas 1959(¹) and 1963,(²) with the objects of determining to what extent accidents at that time were more frequent than usual and, if they were, whether any of the major factors leading to the increase could be identified.

These investigations, which included an analysis of casualties day by day over a period of 13 years, showed that in most of the years for which traffic data are available (i.e. since 1957) the casualty rate per motor vehicle-mile travelled was higher at Christmas than on the same days of the week in the earlier part of December. Although bad weather usually occurred in at least a few districts each Christmas and might have accounted for some of the increase in casualty rate, exceptionally bad weather is unlikely to have been the sole reason for the increase every Christmas. It was therefore concluded that many of the additional casualties at Christmas must be attributed to factors associated with the activities which occur during that period.

Following publication of the Laboratory's report on accidents at Christmas 1963(²), the Government decided to conduct, during the weeks preceding Christmas 1964, a national campaign to discourage driving after drinking alcohol. In October 1964 the Road Research Laboratory was invited to carry out an investigation into fatal accidents at Christmas and to study the incidence of road accidents in general to see whether the campaign had any discernible effect on the casualty rate at Christmas. Advance arrangements were accordingly made for all police forces in Great Britain to send to the Laboratory full details of the fatal accidents in their districts during Christmas (which was taken to extend from December 23rd to 28th, 1964, inclusive) and at New Year in Scotland (December 31st, 1964 to January 4th, 1965, inclusive). Advance arrangements were also made with coroners and procurators fiscal for the blood of certain road users killed during December 1964 and January 1965 to be tested for the presence of alcohol and the results to be sent to the Laboratory. The Laboratory is most grateful to all those concerned for their co-operation in providing this information.

The analyses in this report refer mainly to fatal accidents in England and Wales or to casualties in Great Britain; some brief details concerning accidents in Scotland only are given in Appendix 1.

PART I. FATAL ACCIDENTS AT CHRISTMAS 1964 IN ENGLAND AND WALES

In accordance with normal practice all those persons who died within 30 days of injuries sustained in a road accident are included in the statistics of fatalities. The final numbers of those killed at Christmas 1964 were therefore not known until the end of January 1965 and not available for analysis until that month's accident returns were received at the Laboratory in late February 1965. Further time was required before interviews could be completed and the full details of every accident could be compiled.

THE NUMBERS OF DEATHS AND FATAL ACCIDENTS

Some tabulations concerning the fatal accidents in England and Wales and the persons involved in them will now be given but it is emphasized that extreme care must be taken in the interpretation of the tables because a sample of accidents as small and specialized as this can rarely be used as a basis for firm conclusions about their causation.

The total number of persons killed in road accidents in England and Wales during December 1964 was 774. Between December 23rd and 28th inclusive, the total killed was 119, an average of 19·8 per day; on Christmas Eve alone 40 people were killed. During the remaining 25 days of December, 655 persons were killed, an average of 26·2 per day, but this figure cannot be directly compared with the daily average at Christmas because allowance must be made for the effects of weather, day of week, any tendency for the numbers to vary systematically over the years, and other factors.

The final number of deaths in road accidents during the Christmas period proved to be about 10 per cent greater than the provisional figures published during or shortly after the holiday (see Table 1):

Table 1

Deaths in road accidents, Christmas 1964

	Dec. 23	Dec. 24	Dec. 25	Dec. 26	Dec. 27	Dec. 28	6-day total
England and Wales:							
Provisional ...	25	36	13	12	9	11	106
Final	28	40	18	11	10	12	119
Scotland:							
Provisional ...	2	3	3	4	1	1	14
Final	3	3	4	6	0	1	17

CLASS OF ROAD USER KILLED

The 119 road users killed in the 110 fatal accidents in England and Wales are classified in Table 2.

Table 2

Fatalities by class of road user

(England and Wales)

Road user	Light hours	Dark hours	All hours	Percentage killed in dark
Pedestrians				
under 15	3	2	5	40
15 or over	13	24	37	65
Pedal cyclists	3	3	6	50
Motorcyclists				
riders	5	5	10	55
passengers		1	1	
Drivers	7	23	30	77
Other passengers	10	20	30	67
Total	41	78	119	66

About two-thirds of all the fatalities occurred in the dark and one-third of those killed were drivers or riders of motor-vehicles.

In addition to the 119 persons killed, a further 109 were injured (59 of them seriously) in the same fatal accidents.

TIME OF DAY AT WHICH PEOPLE WERE KILLED

The number of persons killed in each hour of the six days is given in Table 3.

Table 3

Times at which people were fatally injured, Christmas 1964 (England and Wales)

Hour beginning	Wednesday Dec. 23		Thursday Dec. 24		Friday Dec. 25		Saturday Dec. 26		Sunday Dec. 27		Monday Dec. 28		6-day total	
	P	O	P	O	P	O	P	O	P	O	P	O	P	O
Midnight				1		3			1	1			1	5
1 a.m.				2	3								3	2
2 a.m.							1						1	
3 a.m.		1				2								3
4 a.m.												1		1
5 a.m.						1				1				2
6 a.m.				1										1
7 a.m.		3		2										5
8 a.m.		1												1
9 a.m.														
10 a.m.					2							2	2	2
11 a.m.	1			1						1	1	1	2	3
12 noon		2					1						1	2
1 p.m.			1	1				1	1				2	2
2 p.m.			1	2	2	3				1		1	3	7
3 p.m.	1		2	1		1	1					1	4	3
4 p.m.		3	1	1			1		1	1	2		5	5
5 p.m.		2	1	1			1						2	3
6 p.m.		4	5	5				1					5	10
7 p.m.	1			1						1			1	2
8 p.m.		4		1				2	1				1	7
9 p.m.	1			1				1				1	1	3
10 p.m.	1	2	1								1	1	3	3
11 p.m.		1	4	3		1	1						5	5
All hours	5	23	16	24	7	11	6	5	4	6	4	8	42	77

P=Pedestrians
O=Other road users

In the 12 hours between 3 p.m. on Christmas Eve and 3 a.m. on Christmas Day 34 persons (half of whom were pedestrians) were killed; in the same hours at Christmas 1963, 52 persons (including 29 pedestrians) were killed.

WEATHER CONDITIONS

Visibility and the state of the road surface at the time of the accidents are shown in Table 4.

About two-thirds of the fatal accidents were in the dark and a quarter of them happened when it was both dark and wet; 18 occurred on icy roads and seven in fog or mist (six of the latter on Christmas Eve). Fog or ice or both were present in 23 of the 110 accidents.

Table 4

Road and light conditions in fatal accidents (England and Wales)

Date	Light hours			Dark hours			Total
	Dry	Wet	Icy	Dry	Wet	Icy	
December 23, 1964 ...	5	1		12	4	1 (1)	23 (1)
December 24	9 (1)	2		11 (2)	15 (2)	1 (1)	38 (6)
December 25	6		1	4	5		16
December 26	4			2	2	3	11
December 27	1		2	1	2	4	10
December 28	1	2	4	2	1	2	12
6 days	26 (1)	5	7	32 (2)	29 (2)	11 (2)	110 (7)

Numbers in brackets (included in the main figure) refer to accidents when fog or mist was present

CHRISTMAS ROAD SAFETY MEASURES

In addition to the national road safety campaign to discourage driving after drinking alcohol, which is considered in detail below, two road safety measures were taken by the Ministry of Transport shortly before Christmas 1964:

(i) local authorities were asked to keep street lights switched on for longer than usual (or all night) during the holiday period;

(ii) on all roads in England and Wales (other than motorways and dual carriageway roads) which normally have no permanent speed limit, a speed limit of 50 mile/h was imposed during the hours of darkness from the evening of December 23rd to the morning of December 29th.

The 110 fatal accidents in England and Wales in the Christmas period have therefore been classified according to speed limits and street lighting conditions at the time (see Table 5).

Table 5

Numbers of fatal accidents classified by speed limits and street lighting conditions December 23–28 incl. 1964 (England and Wales)

Speed limit (mile/h)	Light hours	Dark hours				Total
		Street lights switched on	Street lights off	No street lighting	Street lighting not ascertained	
30	18	32	1	1	2	54
40	2	5		1		8
50 (dark only*)	—	4		16	4	24
None (excluding motorways)	17	2		2	1	22
None (motorways)	1			1		2
All roads	38	43	1	21	7	110

*This limit applied in dark hours only, to roads normally unrestricted (except dual carriageways and motorways) from the evening of December 23rd to the morning of December 29th

One-half of the accidents occurred on roads with 30 mile/h speed limits and nearly one-quarter on those with the temporary 50 mile/h speed limit. Insufficient data are available, however, to permit a satisfactory assessment of the effect on accidents of the two measures.

L-DRIVERS

Of the 146 motor vehicle riders and drivers involved in the fatal accidents in England and Wales eight were learner-drivers and one had never been licensed.

PART II. THE DRINK AND DRIVING CAMPAIGN

A nation-wide campaign to discourage driving after drinking alcohol was launched by the Minister of Transport on November 18th, 1964.

One of its main objects was to reduce the accident rate at Christmas and the Laboratory was therefore asked to study in the course of its investigation of fatal accidents at Christmas whether the campaign had any discernible effect on the casualty rate.

The casualty rate at Christmas 1964 was in fact lower than in recent years. Some of the reasons for this will be dealt with in Part IV of the Report.

It is known that the consumption of alcohol, even in small amounts, can impair the ability to perform tasks similar to driving.(3) This impairment is not always present to the same extent; a given amount of alcohol can affect different individuals, or even the same individual, in different ways, depending on a number of physiological factors and other circumstances. Several investigations have shown, however, that on the average a driver's chance of being involved in an accident (which is never entirely absent) is increased if he has recently consumed alcohol and that this risk increases with the amount taken.(4)(5)

If more alcohol is consumed at Christmas than at other times of the year (including that consumed by people who normally take little or none) the proportion of road users at that time who have consumed some alcohol can be expected to be higher than usual and this might explain part of any increase in the casualty rate at Christmas.

It is relevant to note here that higher accident rates have also been found at or shortly after other times of increased alcohol consumption, e.g. on Friday and Saturday evenings and shortly after closing time for public houses on other days.(6)(7)

In the light of the above knowledge concerning the effect of alcohol, the results of the Laboratory's investigations into fatal accidents at Christmas 1959 and 1963 indicated that alcohol could have played an important part in giving rise to the increased casualty rate, and after the publication of the second of these reports the Minister of Transport decided, in the autumn of 1964, to conduct the national drink and driving campaign. This consisted mainly of advertising, at an overall cost of £479000, through posters, the press and television, and was intended to present to the public the available evidence on the effect of alcohol, together with the present requirements of the law on drink and driving. The campaign, which was to reach a climax just before Christmas, was designed to bring about a change in attitude and driving behaviour.

The Road Research Laboratory asked the police to send all available details of fatal accidents in the Christmas period to the Laboratory and in each case to include a statement indicating which road users involved were believed to have consumed alcohol within two hours of the accident (or were considered to be still affected by alcohol consumed earlier). Coroners and procurators fiscal were also asked to arrange for samples of the blood of persons aged 12 years or more (16 in Scotland) who died instantly or within 12 hours of being injured in a road accident during December 1964 and January 1965 to be analysed for alcohol content and the results sent to the Laboratory. The response to these requests is gratefully acknowledged.

For the purpose of this analysis a 'drink' accident is defined as one in which there is reason to believe that somebody involved (i.e. a rider, a driver or an injured pedestrian) had consumed some alcohol within two hours of the accident or was still affected by alcohol consumed earlier than this. This definition is a little more precise than the one used in the 1963 investigation and its use, together with the information received from coroners, probably resulted in a higher proportion of accidents being classed as 'drink' accidents than at Christmas 1963, although (because of the time limit) a few in which alcohol had been consumed might have been excluded from the 'drink' accidents. It is, of course, still possible for alcohol to have been consumed by some road users involved without this becoming known. The overall proportion of 'drink' accidents is therefore probably under-estimated. Consumption of alcohol by passengers has been ignored, although it is possible that in a few cases the driver's behaviour was influenced by that of a passenger who had been drinking.

The 110 fatal accidents in England and Wales during the six-day Christmas period involved 152 riders and drivers (including six pedal cyclists). It is known that at least 31 per cent of these had consumed alcohol within two hours before the accident or were still affected by alcohol consumed earlier than this. The corresponding result for the four days of Christmas 1963 was 32 per cent, but the two figures are not strictly comparable because of the different lengths of the two periods and because the changes mentioned above yielded more information about alcohol consumption. There was again some evidence that drinking was less frequent amongst older drivers (see Table 6) and that drivers aged 60 or more formed a very small proportion of the total drivers involved.

Table 6

Drivers and riders involved in 110 fatal accidents December 23rd–28th, 1964 (England and Wales)

Age	Number that had been drinking alcohol	Number that had not been drinking alcohol	Not ascertained whether driver had been drinking alcohol	Total drivers and riders	Percentage that had been drinking alcohol
15–19 ...	4	11 (1)		15 (1)	27
20–24 ...	11	17		28	39
25–29 ...	7	16	1	24	30
30–39 ...	12 (1)	21		33 (1)	36
40–49 ...	6	20 (2)		26 (2)	23
50–59 ...	5 (1)	12		17 (1)	29
60–69 ...		3 (1)		3 (1)	(20)
70–79 ...	1	1		2	
Not known		2	2	4	
All ages	46 (2)	103 (4)	3	152 (6)	31

Numbers in brackets (included in the main number) are pedal cyclists

The proportion of drinking drivers was significantly* greater in the fatal accidents involving only one moving vehicle (i.e. no other moving vehicles or pedestrians involved) than in the remaining accidents (see Table 7).

Table 7

Proportion of riders and drivers who had been drinking alcohol, December 23rd to 28th inclusive 1964 (England and Wales)†

Drivers in fatal accidents involving only one moving vehicle (i.e. no other moving vehicles or pedestrians involved)			Drivers in all other fatal accidents		
Had been drinking	Had not been drinking	Percentage been drinking	Had been drinking	Had not been drinking	Percentage been drinking
19	14	58	27	89	23

†Excludes 3 drivers (not ascertained whether they had been drinking)

The police stated that 30 riders or drivers in the fatal accidents lost control of their vehicles; 17 of these had consumed some alcohol.

Some further details concerning the incidence of alcohol in the fatal accidents are given in Tables 8 and 9.

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*The difference between two results is said to be statistically 'significant' if statistical tests show that the difference would not have occurred more than once in 20 similar comparisons under conditions in which no real difference existed

Table 8

Alcohol and fatal accidents at Christmas 1964
(England and Wales)

	Dec. 23	Dec. 24	Dec. 25	Dec. 26	Dec. 27	Dec. 28	6 days
Total number of fatal accidents	23	38	16	11	10	12	110
All fatal 'drink' accidents*	6	22	10	3	3	4	48
Percentage of all fatal accidents	*26*	*58*	*63*	*27*	*30*	*33*	*44*
Fatal accidents in which at least one rider or driver had been drinking	6	20	9	3	2	4	44
Percentage of all fatal accidents	*26*	*53*	*56*	*27*	*20*	*33*	*40*
Number of pedestrians killed	5	16	7	6	4	4	42
Pedestrians killed who had been drinking alcohol	1	5	1	1	1	1	10
Number of riders and drivers involved ...	37	50	19	15	14	17	152
Riders and drivers who had been drinking alcohol	7	21	9	3	2	4	46

*As defined in the text, p. 8

Table 9

Details of pedestrians killed, December 23rd–28th inclusive
(England and Wales)

Age of pedestrian	Number killed	Pedestrian killed had consumed alcohol	Driver had consumed alcohol
0–14	5		
15–29	5	1	2
30–59	8	3	4
60 or over ...	24	6	6
All ages... ...	42	10	12

'Drink' accidents formed 44 per cent of all the fatal accidents and in 40 per cent of them, at least one rider or driver involved had consumed alcohol. The corresponding proportions on Christmas Eve and on Christmas Day both exceeded 50 per cent. Of the 119 fatalities, 53 occurred in the 48 'drink' accidents and 66 in the 62 other accidents. Of the pedestrians killed 24 per cent had consumed alcohol.

At Christmas 1963 the evidence available showed that 'drink' accidents formed 48 per cent of all fatal accidents and that 32 per cent of riders and drivers had consumed alcohol. If the additional information on alcohol consumption which was obtained in 1964 had been obtained in 1963 these percentages would have been even higher but it is doubtful whether they would have exceeded by much more the 1964 values of 44 per cent and 31 per cent. It cannot therefore be decided from these results whether the campaign reduced either the percentage of drinking drivers or the percentage of fatal accidents involving drink at Christmas 1964.

It is nevertheless possible that, although the proportion of riders and drivers who had consumed alcohol was almost unchanged, the amounts consumed may have been less and the risk of accident thereby reduced. Comparable information for the two Christmas periods is not available to verify this.

References to alcohol made in the reports of the 'drink' accidents are listed in Appendix 2 to indicate the information available as to where and how much alcohol was alleged to have been consumed. Table 10 shows that public houses were the most frequent places at which the alcohol had been consumed.

Table 10

Where alcohol was consumed in 48 fatal 'drink' accidents (England and Wales) Christmas 1964

Place	Driver or rider	Pedestrian killed
At own home	2	
At home of friend or relative	4	
At work	1	
Office party, etc.	3	
Public house	27	4
Club	10	3
Public house or club	1	1
Not known	5	3
Number of persons involved	46	10

Note: Some persons consumed alcohol at more than one place

In support of the drink and driving campaign, various official and commercial organizations discouraged or prohibited office parties at Christmas 1964, and the small number of drivers in fatal accidents who had consumed alcohol at such parties might be a reflection of this. It is also possible that, as a consequence, some drinking was transferred to public houses.

BREATH ALCOHOL SURVEY, DECEMBER 1964

On seven evenings in December 1964 a survey was made of the blood alcohol levels of about 2000 drivers and motorcyclists who were stopped at two main road sites about 20 miles south of London, most of whom agreed to assist in the study. The surveys, which were made between 6.0 p.m. and midnight on the 2nd, 3rd, 9th, 16th, 17th, 23rd, and 24th of December were undertaken to obtain information about the distribution of alcohol levels among drivers during December and to detect if possible any variations in the distribution during the period. It was appreciated that the survey data would not necessarily be representative of conditions in the country as a whole. The blood alcohol levels were estimated from analyses of breath samples taken on site. In addition the following information was requested from drivers in a short interview: age; occupation; length of journey; time since taking last alcoholic drink; normal frequency of drinking. The sex of the driver, the type and size of vehicle and the number of passengers were also recorded.

The overall distribution of blood alcohol levels among drivers co-operating in the survey is shown in Table 11.

Table 11

*Estimated blood alcohol levels of riders and drivers of motor vehicles stopped and tested on the road on seven evenings of December 1964**

Drivers	Blood alcohol levels (mg/100 ml)							
	0–4	5–24	25–49	50–99	100–149	150–199	200 or over	Total
Number ...	1446	190	65	33	3	2	0	1739
Per cent ...	83·2	10·9	3·7	1·9	0·2	0·1	0·0	100·0

*Excluding 220 drivers who refused to be tested and 88 drivers who had consumed alcohol so recently that some was still present in the tissues of the mouth and throat, thus invalidating the estimate of blood alcohol obtained from a breath sample

Excluded from Table 11 are 88 drivers who were stopped and who had consumed alcohol so recently that some was still present in the tissues of the mouth and throat, thereby invalidating any blood alcohol estimate from the breath sample. These 88 and the 293 with 5 mg or more of alcohol per 100 ml of blood give a total of 381 who had consumed alcohol, i.e. 21 per cent of the 1827 drivers tested.†

Two hundred and twenty drivers refused to take part in the survey when stopped. Had they been tested their results might have materially affected the distribution of the alcohol levels in the sample.

The proportion of drivers who had consumed alcohol was consistently higher in the late evening than in the early evening; between 6 p.m. and 8.30 p.m. it was 12 per cent and between 10 p.m. and midnight it was 31 per cent.

The data obtained just before Christmas on the evenings of December 23rd and 24th were examined separately in order to detect any differences on these evenings from corresponding weekday evenings earlier in the month. Compared with results for evenings earlier in December there were no detectable differences in the age, sex or occupation of the samples of drivers tested on these evenings;

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† Any reading less than 5 mg of alcohol per 100 ml of blood was taken to indicate that no alcohol was present, because the instrument occasionally indicated a small alcohol reading (less than 5 mg) even when none was actually present

neither were there differences in the size of car they drove nor in the number of passengers they carried. It was found, however, that on December 23rd and 24th the proportions of drivers who had been drinking were higher than on December 9th, 16th and 17th but not higher than those on the first two evenings of the survey—December 2nd and 3rd. These differences were most marked in the early evening (between 6 and 8.30 p.m.) when the proportions of drivers and motorcyclists who had been drinking increased from about 9 per cent on December 9th, 16th, 17th to about 16 per cent on December 23rd and 24th. A small but similar change which occurred in the late evening (between 10 p.m. and midnight) could have occurred by chance. These results are consistent with the possibilities that (i) a progressive reduction in drinking by drivers occurred during the survey due to the drink and driving campaign, (ii) drinking drivers avoided the sites as the locations became known and (iii) an increase in the proportion of drinking drivers occurred immediately before Christmas.

The proportions of drivers driving long distances were greater on December 23rd and 24th than on the five evenings earlier in December. The proportion travelling on journeys of over 60 miles on these two days was about 25 per cent in the early evening and about 20 per cent in the late evening, compared with 10 per cent and 8 per cent respectively on the five evenings earlier in December.

The proportion of drivers refusing to take part in the survey remained constant for all evenings (and for both early and late evening periods) at 11 per cent.

As, however, there is no detailed information about the variations in drivers' blood alcohol content before Christmas that would have occurred without a campaign, and because the results of this survey may not be representative of the country as a whole, these data provide no firm evidence about the effect of the campaign.

THE BLOOD ALCOHOL LEVELS OF ROAD USERS KILLED IN ACCIDENTS IN DECEMBER 1964 AND JANUARY 1965 IN ENGLAND AND WALES

As already mentioned, coroners in England and Wales and procurators fiscal in Scotland were asked to assist the Road Research Laboratory by arranging a test for alcohol to be carried out wherever possible on the blood of persons killed in road accidents during December 1964 and January 1965 and by sending the results, with details of the accident and the person killed, to the Laboratory. The information was to be provided only for persons aged 12 years or more (16 years in Scotland) who died within 12 hours of the accident.

There was a very good response to this request and the results of blood alcohol tests were received for 733 cases in England and Wales. Tables 12 and 13 are derived from these returns (results for Scotland are being analysed separately).

Table 12

Distribution of blood alcohol levels for road users killed in England and Wales in December 1964 and January 1965*

Alcohol level (mg/100 ml)	Drivers of cars, taxis, commercial vehicles, and motorcyclists		Pedal cyclists		Pedestrians		Other road users		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
0– 4	165	61·8	41	77·4	190	69·9	86	61·0	482	65·8
5– 49	23	8·6	6	11·3	13	4·8	18	12·8	60	8·2
50– 99	23	8·6	1	1·9	12	4·4	14	9·9	50	6·8
100–149	21	7·9	1	1·9	15	5·5	7	5·0	44	6·0
150–199	20	7·5	1	1·9	14	5·1	14	9·9	49	6·7
200–249	11	4·1	3	5·6	12	4·4	—	—	26	3·5
250–299	3	1·1	—	—	9	3·3	2	1·4	14	1·9
300–349	1	0·4	—	—	5	1·8	—	—	6	0·8
350–399	—	—	—	—	2	0·8	—	—	2	0·3
400 or over	—	—	—	—	—	—	—	—	—	—
Total	267	100·0	53	100·0	272	100·0	141	100·0	733	100·0

* As defined in text, p. 13

Table 12 shows that 38 per cent of the drivers and motorcyclists and 34 per cent of all the 733 persons whose blood was tested after deathc an be said definitely to have consumed some alcohol (i.e. they had a blood alcohol level of 5 mg/100 ml or more).

An alcohol level of 50 mg/100 ml had been stated by the British Medical Association to be the highest consistent with safety on the road while driving; the statement was publicized for the purposes of the drink and driving campaign and was also used in the form of the 'three drinks' rule. Table 12 shows that this level was reached or exceeded by 30 per cent of motorcyclists and drivers killed whose blood was tested. The highest level recorded for motorcyclists and drivers was more than six times this value. Table 12 also shows that, of the 102 drivers and motorcyclists killed who had consumed alcohol, 79 had alcohol levels of 50 mg/100 ml or more. The proportion of drivers and motorcyclists reaching this level was higher than that of each of the other three categories of road user killed.

In the breath alcohol survey made at two sites near London, 21 per cent of motorcyclists and drivers were found to have consumed alcohol, whereas the data in Table 12 show that in this sample 38 per cent of motorcyclists and drivers killed had done so. This suggests a higher fatal injury rate for those drinking than for those not drinking but as the results of the breath alcohol survey may not be representative of conditions in the country as a whole the result of this comparison must be treated with considerable reserve.

To detect whether any increase in the proportion of fatalities who had consumed alcohol occurred during the Christmas and New Year period the data for the two months were broken down into three periods:

(1) Tuesday, December 1st to Sunday, December 20th inclusive (3 weeks less one day)

(2) Monday, December 21st to Sunday, January 3rd inclusive (2 weeks)

(3) Monday, January 4th to Sunday, January 31st inclusive (4 weeks).

It should be noted that period (2) contained both the Christmas (December 24th, 25th and 26th) and New Year holidays (December 31st and January 1st).

Table 13 shows that of all road users killed the proportion having blood alcohol levels of 5 mg/100 ml or more differed between days of the week in each of these periods.

The table shows that during the Christmas and New Year period, the days on which the proportion of those killed who had consumed alcohol was highest were the two Thursdays (Christmas Eve and New Year's Eve), and the two Fridays (Christmas Day and New Year's Day) whereas the highest proportions in the other two periods occurred on Saturday and Sunday. The average proportion on the two Thursdays and two Fridays combined was not significantly higher than that on the ordinary Saturdays and Sundays combined in the other two periods.

Table 13

Proportion of road users killed who had been drinking alcohol*

(England and Wales)

Day of week	Period						Whether change between periods significant
	Before Christmas (2 weeks and 6 days)		Christmas and New Year (2 weeks)		After New Year (4 weeks)		
	Total fatalities	% drinking	Total fatalities	% drinking	Total fatalities	% drinking	
Monday	34	32	24	17	22	23	No
Tuesday	48	19	23	30	26	23	No
Wednesday ...	44	27	27	22	37	19	No
Thursday ...	35	17	35	49	36	25	Yes
Friday	58	36	35	69	31	19	Yes
Saturday	66	41	17	24	52	60	Yes
Sunday	50	44	11	27	22	64	No
Total	335	32	172	38	226	35	No

* Over 12 years of age and who died within 12 hours of being injured in a road accident

Table 14

Proportion of drivers of cars, taxis, commercial vehicles and motorcycles killed who had been drinking alcohol*

(England and Wales)

Day of week	Period						Whether change between periods significant
	Before Christmas (2 weeks and 6 days)		Christmas and New Year (2 weeks)		After New Year (4 weeks)		
	Total fatalities	% drinking	Total fatalities	% drinking	Total fatalities	% drinking	
Monday	10	50	7	29	8	12	†
Tuesday	19	16	5	20	5	0	†
Wednesday ...	17	35	12	8	10	20	†
Thursday ...	10	10	17	53	10	40	No
Friday	27	30	16	81	12	33	Yes
Saturday	26	38	2	0	24	62	†
Sunday	18	56	5	40	8	62	†
Total	127	34	64	44	77	40	No

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* Over 12 years of age and who died within 12 hours of being injured in a road accident

† Owing to small numbers, reliable statistical tests could not be made

Table 14 gives similar results for drivers and motorcyclists only and shows a similar transfer of the highest proportions drinking alcohol from the week-end to the Thursdays and Fridays in the Christmas and New Year period. The proportion drinking on the two Thursdays and two Fridays combined was again not significantly higher than that on the ordinary Saturdays and Sundays combined in the other two periods.

In this sample four of the five riders and drivers killed between 3 p.m. on December 24th and 3 a.m. on December 25th had consumed alcohol, whereas in the other hours of these two days five out of 11 had done so. Similarly, between 3 p.m. on December 31st, 1964 and 3 a.m. on January 1st, 1965 nine of the 11 riders or drivers killed had consumed alcohol, whereas during the remainder of those two days five out of eight had done so.

PART III. OTHER EFFECTS OF THE DRINK AND DRIVING CAMPAIGN

Publicity material used in the drink and driving campaign began to appear on the 23rd November and the campaign was in the main completed by the end of the year. The main object of the campaign was to reduce the incidence of accidents due to drinking by drivers. It was planned to reach its peak at Christmas time; it's message was presented indirectly, in the slogan "Don't ask a man to drink and drive". At the same time, some guidance was given as to the amounts of drink which can produce a concentration of 50 mg of alcohol per 100 ml of a driver's blood (which, according to the British Medical Association, is the highest concentration that is entirely consistent with safety on the road). Information was also presented on the legal penalties for the offence of driving under the influence of drink.

In evaluating the campaign, evidence of a change in behaviour was regarded as being of prime importance. Any change in attitudes, leading to people being less tolerant of drinking and driving, could also be regarded as an important, though less valuable, achievement. Similarly, changes in opinion as to what is the most which can safely be drunk before driving, or an increase in the knowledge of legal penalties, would also show that the campaign had achieved some of its objectives.

To investigate the effects of the campaign, 1126 male motorists were interviewed before the campaign began and a different sample of 1023 male motorists was interviewed after the campaign. Random samples of households were selected from all over the country and male drivers at these households were interviewed, allowances being made for different numbers of drivers in each household. Within the limits imposed by the size of each sample, it can therefore be assumed that each sample fairly represents the views of male motorists as a whole. Interviewing took place between 26th October and 20th November, 1964 in the first survey and between 4th and 29th January, 1965 in the second survey.

THE INCIDENCE OF DRINKING AND DRIVING

It seemed essential to try to discover if there had been any reduction in the incidence of drinking before driving at Christmas time. Ideally such data would be obtained by observing behaviour at two successive Christmas periods, but as no data of this kind were available for an earlier period, the only method available was to ask drivers to recall what they had done a year previously. On this basis, it does not seem that the incidence of drinking before driving was any less at Christmas 1964 than at Christmas 1963; however, memory is known to be unreliable over long periods and it could well be that the lapse of time since 1963 led to an understimate of the extent to which drinking before driving took place at that period.

Of the drivers interviewed after the campaign, the 98 per cent who said they had seen the publicity were asked about their drinking habits now, as compared with 3 months ago. Of the 869 drivers who drink beer, 26 per cent said they were less likely now to drink a bit *too* much and then drive, and 72 per cent said their behaviour had not changed in this respect. Twenty-two per cent said they were less likely now to drink *at all* and then drive, and 76 per cent said their behaviour had not changed in this respect. Similar proportions applied for those who drink spirits and for those who drink sherry.

KNOWLEDGE OF 'DRINKING LIMITS'

The campaign also set out to increase knowledge about levels of alcohol intake above which it was not safe to drive. Among the drivers interviewed before the campaign, 37 per cent cited 1½ pints of beer, or less, as the amounts which were 'safe' for any one other than a teetotaller to drink before driving. A limit of 1½ pints of beer, based on the British Medical Association figure, was later referred to in the campaign. After the campaign, 32 per cent cited these quantities. Before the campaign, 79 per cent cited 3 tots of spirits, or less, as amounts that any one except a teetotaller could 'safely' drink before driving; after the campaign, 64 per cent cited these quantities. The quantity referred to in the campaign was three single whiskies. Some of these changes arose because the proportion who said they did not know how much could 'safely' be drunk before driving, or did not state a definite 'safe' quantity, increased very markedly after the campaign compared with before (from 7 per cent to 24 per cent for beer drinkers; from 8 per cent to 28 per cent for spirit drinkers). This may be a favourable sign if it means that after the campaign drivers were less prepared to be precise about how much any one could 'safely' drink.

KNOWLEDGE OF LEGAL PENALTIES

The campaign set out to inform the public about the legal penalties for offences concerning driving after drinking alcohol. Drivers were asked: "What is the maximum punishment, for a first offence, for a motorist who actually drives, or attempts to drive, when he has had too much to drink?". A fine, imprisonment, and disqualification, are involved. Among the drivers interviewed before the campaign 51 per cent mentioned a fine and 54 per cent did so afterwards; 6 per cent mentioned the right amount (£100) before the campaign and 12 per cent did so afterwards; imprisonment was mentioned by 18 per cent in the group interviewed first and by 22 per cent in the second group; disqualification was mentioned by 24 per cent in the first group and by 28 per cent in the second group, the latter group mentioning slightly longer periods than the former.

Thus, knowledge of the legal penalties was slightly greater after the campaign. In addition, attitudes towards punishments changed slightly; among those interviewed before the campaign, 24 per cent said that a maximum fine of £100 for cases tried by a magistrate was too severe, but 20 per cent said this after the campaign. Before the campaign, 52 per cent of motorists said that a maximum prison sentence of two years for cases tried by a jury was too severe, whereas 47 per cent said this after the campaign.

ATTITUDES TO DRINKING AND DRIVING

To examine any effect of the campaign on attitudes towards drink and driving, nine statements about drinking and driving were read out to the drivers and they were asked if they agreed or disagreed with them. With every statement, drivers interviewed after the campaign appeared as less tolerant towards drinking and driving than drivers interviewed before the campaign. Thus 78 per cent of drivers interviewed before the campaign disagreed with the statement that 'far too much fuss is made about the dangers of drinking and driving', as compared with 84 per cent of drivers who disagreed with this after the campaign; 33 per cent of drivers interviewed before the campaign agreed that it was true that 'some people drive better after one or two drinks', whereas after the campaign 24 per cent of drivers said this; 46 per cent of those interviewed before the campaign agreed that 'people who drink and drive should be disqualified from driving', whereas after the campaign 55 per cent of drivers agreed with this.

Drivers were asked to give their views on the seriousness of 11 traffic offences, and these included three which had to do with drink. When asked to rate these offences as to whether they were morally wrong, there was a shift after the campaign towards regarding these three as morally more wrong, but a shift of equal magnitude occurred with regard to the other traffic offences. When asked to rate these offences as to how severely they should be punished there was scarcely any change of opinion after the campaign and the same applied to offences of other kinds. When asked about the chances of each offence causing an accident, the offences which had to do with drink were regarded by those interviewed after the campaign as more likely to cause an accident; the change was not statistically significant, however, and changes in the same direction occurred for traffic offences of other kinds, though to a lesser extent. It is relevant here that strong disapproval of one of the offences, 'a man actually driving when he had had too much to drink', was shown before the campaign, so that there was little scope for change here.

The campaign slogan was "Don't ask a man to drink and drive". A question was put to see what views were held of "a host at a party who offers a drink to someone who is going to drive and has already had quite a bit to drink". Drivers were asked to say whether each of a set of possible descriptions applied or did not apply. Before the campaign, 29 per cent thought such a host hospitable, 86 per cent thoughtless, 32 per cent criminal, 88 per cent foolish, 48 per cent friendly, and 77 per cent irresponsible. After the campaign, 30 per cent thought him hospitable, 93 per cent thoughtless, 36 per cent criminal, 89 per cent foolish, 47 per cent friendly and 81 per cent irresponsible. Except for the judgement on 'hospitable', in each case the opinions have changed in the direction that would be expected if the campaign had had an effect.

To sum up these studies, drivers' reports on their own behaviour do not suggest that they were less likely to drink and drive at Christmas 1964 than at Christmas 1963. However, reporting on this may well have been inaccurate when such a long period had elapsed and it is conceivable that other factors could have operated to cancel out the effects of the campaign on Christmas drinking. On the other hand, many drivers interviewed after the campaign reported that they were less likely to drink and drive than they were three months previously. Knowledge as to how much could 'safely' be drunk before driving did not increase but after the campaign drivers were less prepared to be precise about how much can 'safely' be drunk before driving. There was an appreciable reduction in the proportion of drivers who thought some people drove better after a few drinks. There was also some increase in knowledge of the legal penalties and an increased tendency to approve of severe penalties. There is evidence that after the campaign drivers were less tolerant of drinking and driving; however, attitudes towards traffic offences unconnected with drinking were also different before and after the campaign.

PART IV. TRAFFIC FLOW AND CASUALTIES IN GREAT BRITAIN

The analysis has so far concerned only fatal accidents in England and Wales. An examination has also been made of changes in the total number of casualties (i.e. killed, seriously injured and slightly injured) in road accidents at Christmas in the whole of Great Britain compared with earlier periods and these have been compared where possible with changes in the amount of traffic. Estimates of the vehicle-miles travelled by motor-vehicles on all *trunk and classified* roads of Great Britain during Christmas and suitable comparison periods earlier in December have been made, using the traffic records obtained by means of automatic counters which have been maintained by the Laboratory since 1956 at 50 permanent traffic census sites on these roads. In the absence of records for unclassified roads it is assumed that traffic on them, which normally forms about 17 per cent of the total on all roads, changed in the same proportion as that on the trunk and classified roads.

These data for traffic and casualties during the seven-day Christmas period December 22nd to 28th and for corresponding days of the week earlier in December (1st to 14th) are given in Table 15 for a number of years.

Table 15
Casualty rates during the period 22nd to 28th December (1957 to 1964)

Year	Christmas Day on	Casualties on all roads in Great Britain (A)	Motor vehicle-miles on classified roads (millions) (B)	Approximate casualty rate per million miles (A)÷(B)	Per cent change compared with 1st to 14th December		
					Casualties	Vehicle-miles	Casualty rate
1957	Wednesday	6223	719	8·7	+11	− 8	+21
1958	Thursday	7446	857	8·7	+21	− 2	+23
1959	Friday	8816	920	9·6	+27	− 6	+35
1960	Sunday	8121	1014	8·0	+18	− 2	+20
1961	Monday	7068	1013	7·0	+ 1	− 8	+10
1962	Tuesday	6723	1006	6·7	− 3	−14	+13
1963	Wednesday	8179	1114	7·3	+18	−16	+40
1964	Friday	6880	1238	5·6	−14	−13	− 1

This shows that from 1957 to 1960 there were substantial increases in the casualty rate each Christmas, when the amount of traffic was always less than usual. In the years 1961 to 1964 the reduction in traffic at Christmas was somewhat greater but 1963 was the only one of these four Christmas periods to have a casualty rate markedly higher than usual. Before any conclusions are drawn from these data, however, the influence of the weather will be considered.

It is known that wet weather in winter tends to increase the frequency of road casualties.⁽⁸⁾ For the present purpose, a convenient measure of the wetness of the weather in any period is the percentage of the casualties that occurred in accidents on wet roads during that period; this is only a very crude measure, since it takes no direct account of other weather conditions, e.g. fog, snow and ice. The effects of weather on road accidents are very difficult to measure with confidence, and this limitation must be realized in the interpretation of the data given below. In Fig. 1 the casualty rates from Table 15 for each Christmas period have been plotted and in each case this measure of wet weather has been indicated.

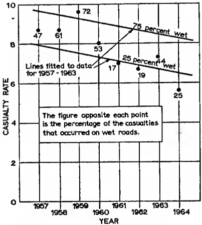

Fig. 1. Casualty rates per million motor vehicle miles on classified roads for period December 22nd to 28th

The diagram shows that the casualty rate at Christmas has on the whole been decreasing since 1957 (Fig. 2 shows that this has also been true of winter months generally), but that when Christmas was wet the casualty rate tended to lie above the general trend. A regression equation fitted to the data for the seven years 1957 to 1963, in which the independent variables are time in years and the above measure of wet weather, yields a family of straight lines; those corresponding to 25 per cent wet and 75 per cent wet are shown in Fig. 1. These indicate that at Christmas 1964 a casualty rate of 6·5 would have been expected, whereas the actual figure was 5·6. This difference appears to suggest that the campaign against driving after drinking had a good effect on the casualty rate at Christmas 1964, but the two figures are not significantly different from each other (see footnote on p. 9). The expected value of 6·5 is lower than any actual values for earlier Christmas periods mainly because of a tendency for the rate to decrease over the years and the fact that Christmas 1964 was fairly dry.

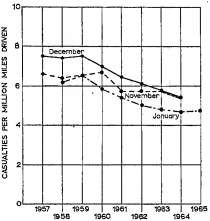

Fig. 2. Monthly casualty rates per million motor vehicle miles in Great Britain

An analysis based on differences between Christmas and the earlier part of December is shown in Fig. 3. Points towards the right-hand side of the diagram correspond to years when Christmas was wetter than the early part of the month. As expected, relatively wet Christmases tend to have relatively high casualty rates; because Christmas 1964 was drier than December 1st to 14th, 1964 a fairly low relative casualty rate was therefore to be expected, but the actual figure was lower still. However, the analysis shows that the 11 per cent difference between the observed change in casualty rate for Christmas 1964 (relative to earlier in December) and the expected change given by the fitted line could have arisen by chance.

Figure 3 also shows that the increase in casualties at Christmas compared with earlier in December was greater in 1963 than in other recent years mainly because Christmas in that year was relatively wet.

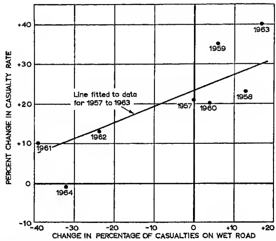

Fig. 3. Change in casualty rate in Christmas period (December 22nd to 28th) compared with December 1st to 14th, in relation to corresponding change in percentage of casualties on wet roads

Table 16

Percentage changes in total casualties at Christmas (December 22nd–28th) compared with the number earlier in December (average of December 1st to 7th and 8th to 14th)

Christmas Day on	Year	Per cent change in number of casualties	Change in per cent of casualties on wet roads
Monday	1961	+ 1	−39
Tuesday	1951	+ 5	+21
	1956*	− 7	− 8
	1962	− 3	−24
Wednesday	1957	+11	0
	1963	+18	+17
Thursday	1952	+22	+22
	1958	+21	+13
Friday	1953	+25	− 1
	1959	+27	+ 6
	1964	−14	−32
Saturday	1954	+18	− 9
Sunday	1955	+15	+16
	1960	+18	+ 4

* Affected by fuel rationing

In the Laboratory's report on accidents at Christmas 1963 it was pointed out that the increase in casualties at Christmas relative to earlier in December has been high in previous years when Christmas Day fell on a Friday and that it might therefore be high at Christmas 1964. Table 16 shows the data for 1964 and some earlier years. In 1953 and 1959, when Christmas Day fell on a Friday, the relative increases in casualties were large and of the same order, but in 1964 there were relatively fewer casualties.

As has already been demonstrated, wet weather is an important factor, but it has not so far been possible to distinguish between the effect of wet weather and the effect of the day of the week on which Christmas Day falls in causing variations in the relative numbers of casualties (see Tables 15 and 16). It is likely, however, that if the second of these factors influences the casualty rates shown in Figs. 1 and 3, then the rates at Christmas 1964 may be lower than might have been expected by a greater amount than the diagrams suggest. No definite conclusion can be reached on this matter, owing to the small number of years for which traffic data are available and the inherent variability of these data.

The two analyses described above tend to show that during Christmas 1964 there were between 10 and 15 per cent fewer casualties than might have been expected if there had been no campaign, taking into account the amount of traffic and the effects of wet weather, long-term trends and the day of the week on which Christmas Day occurred. It has not been possible, however, to say whether any of this reduction can be attributed to the drink and driving campaign or whether it is due to other causes; the variability of the data is such that it could have arisen by chance.

AN ANALYSIS OF DECEMBER CASUALTIES BY HOUR OF DAY

In this part of the report the possible effect of the campaign is measured in another way. An analysis was made to discover whether the 1964 campaign against driving after drinking alcohol had any effect on casualties, using casualty trends at different times of day. It is known that the percentage of accidents involving alcohol is usually higher in certain hours than in others, and so, if the 1964 campaign had any tendency to reduce the number of such accidents, one would expect to find casualties in these hours relative to those in other hours to be lower in 1964 than in earlier years.

The data used are numbers of casualties in Great Britain in December 1962, December 1963 and December 1964, broken down by day of month and by hour of day. Information about the weather on each day was obtained from a breakdown of each day's casualty total according to whether the road was dry, wet or icy at the times of the accidents. Hourly traffic flow data from automatic counters at several sites in the London area were also studied but it is emphasized that traffic at these sites may not be representative of traffic in the country as a whole.

Information about the incidence of accidents involving alcohol was obtained from Jeffcoate (1953)⁽⁶⁾. This gave the numbers of injury accidents in Great Britain in 1951, broken down by hour of day, day of week (Monday to Friday, Saturday, Sunday) and whether or not the police gave "under the influence of drink or drugs" as a contributory factor. Although these statistics are believed to underestimate the proportion of the year's accidents that involved alcohol, they can be assumed to give a fairly clear indication of the hours in which the highest proportion of such accidents occur. The frequencies of these accidents are often small, so the percentages are subject to considerable chance fluctuations, but it appears that such accidents reach their highest percentages (above about 3 per cent of the total) between the following hours:

Monday to Friday : Midnight to 4 a.m.
10 p.m. to midnight
Saturday : Midnight to 4 a.m.
8 p.m. to midnight
Sunday : Midnight to 4 a.m.

Information for Christmas Eve and Christmas Day was obtained from special information provided by the police about fatal accidents on these days in 1963 and 1964. Combining the figures for the two years, one finds that about one half of the fatal accidents on each of the two days is associated with drinking alcohol, but that the proportion is higher in certain hours. The accident frequencies are rather small, so some subjective judgement is required, and on this basis the following hours were selected as those with particularly high proportions of accidents involving road users who have been drinking alcohol:

Christmas Eve: Midnight to 4 a.m.
4 p.m. to midnight
Christmas Day: Midnight to 6 a.m.
2 p.m. to 4 p.m.
8 p.m. to midnight.

Each day in each of the three Decembers was classified as dry, wet or icy according to which road condition was most frequently reported in that day's injury accidents. To eliminate as far as possible variations due to weather and other factors, comparisons of 1964 with 1962 and 1963 combined were made only for days which had the same weather classification, which were on the same type of day (four main types: Monday to Thursday, Friday, Saturday, Sunday), and which were at about the same date in the month. Details are shown in Table 17.

Table 17

List of dates in December used for comparisons of 1964 with 1962 and 1963

		Before campaign		During campaign
		1962	1963	1964
Up to December 23rd				
Mon–Thurs.:	Dry	10, 13, 18, 19	2, 3, 4, 5, 9, 10, 11, 12, 17, 18, 19, 23	2, 3, 14, 15, 22, 23
	Wet ...	11, 12, 17, 20	16	7, 8, 9, 10, 16, 17, 21
Friday:	Dry	21	6, 13, 20	4, 18
	Wet ...	7, 14	—	11
Saturday:	Dry	1	7	19
	Wet ...	8, 15, 22	14	5, 12
Sunday:	Wet ...	—	15	6, 13, 20
Christmas				
Christmas Eve:	Dry	24	24	24
Christmas Day:	Dry	25	—	25
After Christmas				
Mon.–Thurs.:	Wet	—	30, 31	30, 31

Some days of one period have not been used because there were no comparable days in the other period. This accounts for the fact that Table 17 contains no icy days.

The results of the next stage of the analysis are shown in Table 18. For each row in Table 17, the hour-by-hour data for the dates in 1962 and 1963 are added over days, to give a single column of 24 figures; 1964 data are added in the same way. The total for the period (1964, or 1962 and 1963 combined) which contains the greater number of days is then scaled down by a factor so that it refers to the same number of days as the total for the other period. For example, 16 dry Monday to Thursdays in 1962 plus 1963, and 6 dry Monday to Thursdays in 1964 were used, so the figure for 1962 and 1963 was multiplied by a factor 6/16 = 0·375 to put it on the same basis as the 1964 figure. After this scaling process had been carried out, the resulting figures were added together over all road conditions and Mondays to Thursdays were added to Fridays.

Table 18

Casualties in comparable periods of December 1962–63 and December 1964*

Hour beginning	Mondays–Fridays (16 days)		Saturdays (3 days)		Sundays (1 day)		Christmas Eve (1 day)		Christmas Day (1 day)	
	1962–3	1964	1962–3	1964	1962–3	1964	1962–3	1964	1962–3	1964
12 midnight ...	237	238	140	166	81	100	20	42	111	186
1 a.m.	122	119	100	87	35	49	11	23	54	86
2 a.m.	52	72	50	48	20	25	7	4	16	16
3 a.m.	43	52	24	19	20	11	7	7	7	22
4 a.m.	23	40	19	11	4	17	4	0	11	5
5 a.m.	89	85	22	22	10	4	5	5	7	7
6 a.m.	269	251	38	38	5	6	12	8	0	2
7 a.m.	1147	1108	90	124	8	9	34	38	4	4
8 a.m.	1195	1266	138	105	9	13	24	33	4	14
9 a.m.	588	652	154	104	9	12	32	27	2	13
10 a.m.	479	521	188	152	13	31	30	37	11	21
11 a.m.	550	541	240	280	32	34	53	85	25	34
12 noon	830	904	318	357	33	44	62	68	34	57
1 p.m.	775	842	236	304	40	44	49	77	50	33
2 p.m.	610	676	268	298	54	68	86	101	49	57
3 p.m.	731	748	246	294	47	68	136	146	33	52
4 p.m.	1496	1479	254	320	65	60	184	195	23	36
5 p.m.	2066	1925	242	250	29	40	140	188	15	26
6 p.m.	1167	1128	214	205	42	46	86	106	13	24
7 p.m.	1018	931	159	177	30	51	90	84	15	17
8 p.m.	657	632	152	161	46	34	62	47	19	9
9 p.m.	600	711	140	130	25	35	49	89	17	25
10 p.m.	844	935	297	287	81	64	70	78	25	39
11 p.m.	988	1010	568	536	59	93	165	155	27	49
Not known ...	15	9	3	7	2	1	3	1	3	0
Total	16593	16876	4300	4482	799	961	1424	1644	575	834

* See text above for explanation

In Table 19, the figures from Table 17 are grouped into those for hours with a high proportion of 'drink accidents' and those with a low proportion of 'drink accidents' as described earlier. The figures for weekdays, Saturdays and Sundays are on a comparable basis and may be combined; those for Christmas Eve and Christmas Day are comparable with each other but not with other days. The table shows that on ordinary days in December, casualties in 1964 were 3 per cent higher than the corresponding average for 1962 and 1963, both in hours with a high proportion of 'drink accidents' and in those with a lower proportion; there is a suggestion that Saturday night casualties were reduced in 1964, but this is completely offset by a rise on weekdays. At Christmas 1964 casualties in the hours with a high proportion of 'drink accidents' rose by 24 per cent, and those in other hours rose by 25 per cent relative to the average for 1962 and 1963.

Table 19

Comparison of adjusted casualty trends in hours with high proportions of 'drink accidents' and other hours*

	Casualties		Per cent change from 1962–3 to 1964
	Average of Dec. 1962 and Dec. 1963	December 1964	
Total, Christmas Eve and Christmas Day			
'Drink accident' hours ...	1267	1571	+24
Other hours	723	906	+25
Total, other days			
'Drink accident' hours ...	3913	4045	+ 3
Other hours	17757	18254	+ 3

* See text (page 27)

Exactly similar calculations were then made using, in place of numbers of casualties, traffic flow data for the same hours and dates obtained from each of three automatic traffic counter sites. Table 20 shows the percentage changes in traffic flow from the average of 1962 and 1963 to 1964 corresponding to the changes shown in the last column of Table 19. It is clear from the results in Table 20 that, except at the Christmas period, the traffic rose by 10 or 20 per cent more in the 'drink accident' hours than in other hours. This increase is somewhat greater than might have been expected from trends in the distribution of traffic through the 24 hours of the day; for example, a study of traffic data at four sites (not necessarily representative of the country generally) showed that between December 1957 and December 1964, traffic in the hours 10 p.m. to 4 a.m. rose by 3 per cent per year more than traffic in the rest of the day. Over a similar period (1955 and 1957 compared with 1962 and 1963) December casualties in Great Britain rose 4 per cent per year more in these hours than in other hours.

Taken in conjunction with the evidence that casualties on ordinary days rose by similar amounts in the two periods of the day, the traffic flow changes show that the casualty rate on those days dropped in 'drink accident' hours, relative to other hours, by 10 to 20 per cent. Table 20, on the other hand, suggests that over Christmas the changes in traffic and casualties were much the same in 'drink accident' hours as in other hours, and hence that the casualty rate in the hours with a high proportion of 'drink accidents' did not change relative to that in other hours.

Table 20

Comparison of adjusted traffic trends at three sites in hours with high proportions of 'drink accidents' and other hours*

	Percentage change in traffic flow (December 1964 compared with average of December 1962 and December 1963)			
	A.41 Bicester	Grosvenor Road Westminster	Commercial Road Stepney	Average of 3 sites
Total, Christmas Eve and Christmas Day				
'Drink accident' hours	+33	+ 6	− 1	+15
Other hours ...	+36	+14	− 4	+19
Total, other days				
'Drink accident' hours	+25	+ 5	+25	+18
Other hours ...	+15	− 5	+ 5	+ 5

* See text (page 27)

It should be pointed out that the change in traffic over the day as a whole at the three sites for which statistics are given in Table 20 was rather different from that given for the country as a whole by the 50-point census.

If the campaign against driving after drinking alcohol had any direct effect, this is likely to have taken the form of a reduced amount of travel, or of a reduction in risk per unit of travel (resulting from reduced consumption of alcohol, from driving being undertaken by those less under the influence, or from greater care being taken both by those who had been drinking and those who had not) or both. All these possibilities would be expected to operate mainly in hours with a high proportion of accidents involving alcohol, and to a smaller extent in other hours. The evidence in Tables 19 and 20 suggests that during these 'drink accident' hours on ordinary days in December there may have been a reduction in the casualty rate of about 10 per cent. However, as the traffic data on which this conclusion is based are hardly adequate, this conclusion should not be regarded as established.

This method of analysis cannot demonstrate any effect that the campaign may have had in making road users more safety-conscious at all times of day; it can only hope to demonstrate the effect on casualties of any changes in driving behaviour after drinking alcohol.

HOURLY ACCIDENT RATES

The vehicle-mileage on trunk and classified roads of Great Britain has also been estimated for each hour of the day and related to the total number of injury accidents on *all* roads in that hour. The resulting injury accident rates (slightly over-estimated because of the exclusion of unclassified roads from the traffic data) for the Christmas period 1964 and for the comparable period one week earlier are shown in Fig. 4.

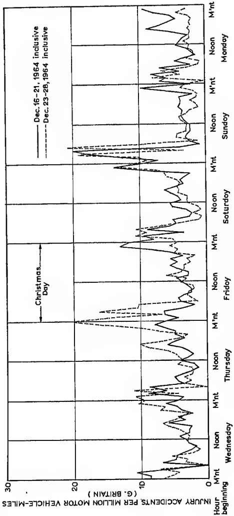

Fig. 4. Hourly injury accident rate in December 1964 (Great Britain)

Rates for the early hours of the morning are based on small accident frequencies and are therefore subject to greater chance variations than are those for other times of day. Nevertheless, a fairly stable pattern emerges: on ordinary weekdays there is a relatively low accident rate mid-morning and mid-afternoon, with a peak during lunchtime, and high values in the evenings or shortly after midnight. These high values are particularly marked on the nights of Friday/Saturday and Saturday/Sunday. At Christmas there were additional peak rates on December 23rd and 24th of about the same value as on the preceding Friday and Saturday.

ACCIDENTS AND TRAFFIC AT NEW YEAR IN GREAT BRITAIN

During January 1965 there were 26961 road casualties (including 582 killed) in England and Wales; in Scotland the corresponding figures were 2063 and 46 respectively. Total casualties at the New Year period were as follows:

Table 21

Total casualties on all roads

	England and Wales	*Scotland*
Thursday, 31st December 1964	950	91
Friday, 1st January 1965	1563	112
Saturday, 2nd January 1965	973	70
Sunday, 3rd January 1965	505	53
Monday, 4th January 1965	784	56

A comparison of the changes in traffic and casualties at New Year relative to conditions on similar days of the week later in January is shown in Table 22 for a number of years:

Table 22

Differences in traffic on classified roads and casualties on all roads in Great Britain (31st December to 2nd January compared with mean of January 7th to 9th and 14th to 16th)

Year	Percentage difference in		
	Traffic	Casualties	Casualty rate
1951–2		+18	
1952–3		+23	
1953–4		+28	
1954–5		+31	
1955–6		+25	
1956–7		+47	
1957–8	− 5	+23	+30
1958–9	+12	+35	+21
1959–60... ...	+ 7	+61	+50
1960–1	− 2	+ 4	+ 6
1961–2	−34	−40	− 9
1962–3	−17	− 9	+ 9
1963–4	− 1	+35	+37
1964–5	− 6	+16	+24

The table shows that the casualty rate has usually been higher at New Year than on similar days later in January and that New Year 1964–65 is not exceptional in this respect. A more precise interpretation of Table 22 would, however, require corrections to be made (for wet weather, etc.) as in the case of the Christmas casualty analysis.

Variations in the hourly injury accident rate at New Year are shown in Fig. 5. These show a substantial increase during the night of December 31st — January 1st to a value greater than the maximum attained at Christmas (see Fig. 4). The following two nights also had marked peaks. Part of these increases might have been associated with the day of the week on which New Year's Day fell and with weather conditions, which were worse at New Year than at Christmas 1964.

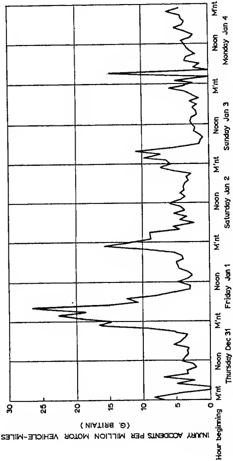

Fig. 5. Hourly injury accident rate at New Year 1964–5 (Great Britain)

CONCLUSIONS

(i) There were 119 persons killed in 110 fatal accidents in England and Wales during the six days December 23rd to 28th, 1964. Fog or ice or both were present in one-fifth of the fatal accidents. Thirty-four of the fatalities occurred in the 12 hours between 3 p.m. on Christmas Eve and 3 a.m. on Christmas Day.

(ii) Police reports indicated that alcohol had been consumed shortly before these accidents by 31 per cent of the riders and drivers involved. Although a similar percentage was obtained from the Christmas 1963 data it does not follow that no change occurred in the proportion of accidents involving alcohol because the information on this was more exhaustive in 1964 than in 1963.

(iii) Samples of the breath of car drivers and motorcyclists were taken at two sites in the south of England between 6 p.m. and midnight on seven weekdays before Christmas in December 1964. One-fifth of those tested had recently consumed alcohol. However, the data are not sufficient to provide satisfactory evidence about the effect of the drink and driving campaign on the numbers of road users driving after drinking alcohol.

(iv) Alcohol was present in the bodies of 34 per cent of road users (excluding children) who died within 12 hours of being injured in a road accident in England and Wales during December 1964 and January 1965. The corresponding result for drivers and motorcyclists was 38 per cent. Of the drivers and motorcyclists killed in this group who had consumed alcohol three out of four had alcohol levels greater than the drink and driving campaign warned drivers against exceeding. A high proportion of the drivers and road users killed on Christmas Eve and New Year's Eve, Christmas Day and New Year's Day had consumed alcohol. This proportion is not significantly different from that for Saturdays and Sundays combined in December and January (excluding the two weeks containing Christmas and New Year). The proportion for these two weeks combined is not significantly greater than that during the rest of the two months.

(v) The number of casualties per mile travelled was lower during Christmas 1964 than during other recent Christmas periods. Analysis showed that, after allowing for the effects of wet weather, the day of the week on which Christmas Day fell, and any tendency for the casualty rate to change systematically over a period of years, there were between 10 and 15 per cent fewer casualties than would have been expected if there had been no campaign. This reduction could however have occurred because of unknown factors or changes in conditions and cannot be definitely attributed to the drink and driving campaign.

(vi) An additional analysis showed that, after the effect of wet weather had been taken into account, there were more casualties on ordinary days of December 1964 (excluding Christmas Eve and Christmas Day) than in the corresponding hours of the two previous Decembers both during the hours with the highest proportions of accidents involving alcohol and in other hours. On the other hand, there is some evidence that on ordinary days the amount of traffic increased more in the 'drink accident' hours than at other times. If this were true for the country as a whole it would suggest that the campaign may have reduced the casualty rate during the 'drink accident' hours on ordinary days of December.

(vii) The highest injury accident rates at Christmas 1964 occurred on the night of December 24th–25th and were about the same as those on the preceding Saturday–Sunday night, when they were higher than on other days of the week. Accident rates on the night of December 31st–January 1st were higher than those at Christmas.

(viii) When interviewed after the campaign about a quarter of drivers who drink reported that, compared with three months ago, they were now less likely to drink a bit too much and then drive. Comparisons of replies from a representative group of drivers interviewed after the campaign with replies from a similar group seen before showed an increase in the proportion who were not prepared to say how much alcohol any one, other than a teetotaller, can safely take before driving and a fall in the proportion who thought some drivers were safer after a few drinks. There was also some increase in knowledge of the legal penalties for drinking and driving offences. Answers to questions about attitudes suggested that after the campaign drivers were a little less tolerant of drinking and driving.

(ix) Although some of the evidence is consistent with casualties being reduced as a result of the drink and driving campaign it is not sufficient to allow a conclusion to be drawn on this point.

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APPENDIX 1

FATAL ACCIDENTS IN SCOTLAND

Because Christmas is not celebrated as a public holiday to the same extent in Scotland as in England and Wales, Scottish accident figures have been excluded from most of the main analysis in this report. On the other hand, New Year is more widely celebrated in Scotland than in England and Wales. Some details of Scottish accidents for both periods are given in this Appendix but the small number available precludes any detailed analysis. No estimates of the vehicle mileage travelled in Scotland only are available.

Christmas 1964

During the six-day Christmas period, 23rd to 28th December, 1964, 17 persons were killed in 14 fatal road accidents in Scotland. There were also two slight casualties in these accidents.

In the whole of December 1964, 74 persons were killed in Scotland. The 17 killed at Christmas included nine pedestrians (of whom four were aged 60 or more) and five passengers in vehicles.

One of the 18 riders and drivers involved in the 14 fatal accidents, and two of the nine pedestrians killed, had consumed some alcohol.

New Year 1964–65

In the period 31st December 1964 to 4th January 1965 inclusive, there were nine fatal accidents in Scotland in which 15 persons were killed (five car drivers, seven car passengers and three adult pedestrians). There were also seven serious casualties in these accidents. Two of the three pedestrians killed and two of the ten drivers involved are known to have consumed some alcohol. Four of the accidents were on wet roads and two on icy roads.

APPENDIX 2

REFERENCES TO ALCOHOL IN ACCOUNTS OF FATAL ACCIDENTS DECEMBER 23rd–28th 1964 (ENGLAND AND WALES)

Drivers (including motorcyclists and pedal cyclists) had consumed alcohol

Time (nearest hour)	
Midnight	Driver's blood contained 184 mg of alcohol per 100 ml of blood (alcohol consumed at public house).
Midnight	Driver had been drinking at a club.
Midnight	Driver had 3 pints of beer at public house between 10.20 and 11.10 p.m. and some previously.
1 a.m.	Post mortem showed 100 mg alcohol per 100 ml of blood (not known where alcohol consumed).
1 a.m.	Driver had 2 beers and 2 whiskies between 8 p.m. and midnight at hotel.
1 a.m.	Driver had 4 or 5 pints of beer at staff party between 7.45 p.m. and 1 a.m.
1 a.m.	Post-mortem on motorcyclist showed 177 mg of alcohol per 100 ml of blood (alcohol consumed at club).
1 a.m.	Post-mortem showed 68 mg of alcohol per 100 ml of blood (alcohol consumed at public house and club).
3 a.m.	Post-mortem showed 247 mg of alcohol per 100 ml of blood (alcohol consumed at friend's house and public house).
5 a.m.	Post-mortem showed 141 mg of alcohol per 100 ml of blood (alcohol consumed at club).
5 a.m.	Driver had been drinking at public house before 11.30 p.m. then had some drink at home.
11 a.m.	Driver had 2 pints of beer at work before accident.
2 p.m.	Driver had been drinking at hotel; known to have had 1 pint of beer at 1.45 p.m.
2 p.m.	Motorcyclist had 2 pints of beer and one whisky in previous 2 hours at home and at club.
2 p.m.	Post-mortem on pedal cyclist showed 205 mg alcohol per 100 ml of blood (alcohol consumed at public house).
3 p.m.	Driver had been drinking in public house before 2.45 p.m.
3 p.m.	Driver had about 2½ glasses of sherry and 1 glass of wine since 11.30 a.m. at friend's house.
4 p.m.	Motorcyclist had 193 mg alcohol per 100 ml blood (alcohol consumed at public house).
4 p.m.	Driver had been drinking at public house and at club. Was asked not to drive afterwards.
4 p.m.	Driver had 2 shandies within previous 2 hours at relative's house.
5 p.m.	Driver had a pint of beer and 3 whiskies in public house within previous 2 hours.
6 p.m.	One driver had 34 mg alcohol per 100 ml blood (alcohol consumed at club). Other driver had 2 pints of beer and one whisky between 2 and 3 p.m. and more drink later at business party.
6 p.m.	Driver's blood contained 171 mg of alcohol per 100 ml of blood (alcohol consumed at public house and friend's house).

Time (nearest hour)	
6 p.m.	Pedal cyclist had 35 mg of alcohol per 100 ml of blood (not known where alcohol consumed).
6 p.m.	Driver believed to have been drinking (not known where) within 2 hours prior to accident.
6 p.m.	Driver had 4 or 5 pints of beer in public houses prior to 3 p.m.
7 p.m.	Driver had 2 rums in public house between 5 and 6 p.m. Doctor thought driving might be impaired.
8 p.m.	One driver known to have had 2 pints of beer in public house between 6.30 and 7.45 p.m. Post-mortem on the other driver showed 50 mg of alcohol per 100 ml of blood (alcohol consumed in hotel).
9 p.m.	Driver had been drinking (not known where).
9 p.m.	Post-mortem showed 135 mg of alcohol per 100 ml of blood (not known where alcohol consumed).
10 p.m.	340 mg of alcohol per 100 ml of urine (equivalent to 255 mg of alcohol per 100 ml of blood) (alcohol consumed at club).
10 p.m.	Motorcyclist had 1 pint of beer in public house about 1½ hours before accident.
11 p.m.	Driver had been drinking at a party.
11 p.m.	Driver had 1½–2 pints beer in public house between 10.05 and 10.40 p.m.
11 p.m.	Post-mortem showed 176 mg of alcohol per 100 ml of blood (alcohol consumed at public house and club).
11 p.m.	Driver had 4 champagne perrys and 1 whisky at public house between 9.30 and 10.45 p.m.
11 p.m.	Driver had 4 or 5 pints of beer and 2 rums at public house between 8.45 and 11 p.m. Doctor thought driver seriously affected by alcohol.
11 p.m.	Post-mortem showed 301 mg of alcohol per 100 ml of blood (alcohol consumed at public house).
11 p.m.	Driver had about 4 pints of beer in public house between 8.30 and 10.45 p.m.

Pedestrian killed had consumed alcohol

Time (nearest hour)	
Midnight	Pedestrian had 8 pints of beer between 7 p.m. and 11.40 p.m. in club and public house.
2 p.m.	Post-mortem showed 265 mg of alcohol per 100 ml of blood (alcohol consumed in public house).
3 p.m.	Post-mortem showed 200 mg of alcohol per 100 ml of blood (not known where alcohol consumed).
6 p.m.	Post-mortem showed 80 mg of alcohol per 100 ml of blood (not known where alcohol consumed).

Pedestrian killed and driver had both consumed alcohol

Time (nearest hour)	
Midnight	Driver known to have had 2 pints of beer in public house between 10.30 and 11 30 p.m. Pedestrian had 4 rums and 2 liqueurs in hotel between 8.20 and 11.30 p.m.

Time (nearest hour)	
3 p.m.	Post-mortem on pedestrian showed 144 mg of alcohol per 100 ml of blood. Driver believed to have been drinking before accident. (Both had been at public house or club.)
10 p.m.	Driver had 6 to 7 pints of beer in public house before 9.40 p.m. Pedestrian's blood contained 40 mg alcohol per 100 ml blood (not known where alcohol consumed).
11 p.m.	Driver had 285 mg alcohol per 100 ml of urine, equivalent to at least 5½ pints of beer (consumed at club). Two pedestrians killed had 4 to 5 pints of beer each at club. Post-mortem showed 206 mg of alcohol per 100 ml of blood in case of one pedestrian.
11 p.m.	Driver known to have consumed 1½ pints of beer at public house since 9.30 p.m. Post-mortem on pedestrian showed 124 mg alcohol per 100 ml of blood (alcohol consumed at public house).

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Ministry of Transport

Road Research Technical Paper No. 79

Road Accidents in December 1964 and January 1965

(with special reference to Christmas and New Year)

LONDON
HER MAJESTY'S STATIONERY OFFICE
1965

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FOREWORD

THIS TECHNICAL PAPER is the third report prepared by the Road Research Laboratory on road casualties at Christmas. It includes the results of studies relating to the national 'drink and driving' campaign, which was held in November and December 1964.

The Laboratory is most grateful to the Home Office, the Scottish Development Department, the police, coroners and procurators fiscal and to various departments of the Ministry of Transport for their assistance and co-operation in providing the details necessary for the investigation.

D. J. LYONS,
Director of Road Research

ROAD RESEARCH LABORATORY,
July, 1965

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